UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,571	06/23/2003	Masao Hori	HARA-072-046	9645

20374 7590 06/11/2008

KUBOVCIK & KUBOVCIK
SUITE 1105
1215 SOUTH CLARK STREET
ARLINGTON, VA 22202

EXAMINER	
NGUYEN, TU MINH	
ART UNIT	PAPER NUMBER
3748	

MAIL DATE	DELIVERY MODE
06/11/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/600,571	HORI ET AL.	
	Examiner	Art Unit	
	TU M. NGUYEN	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 08/875,577.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. An Applicant's Amendment filed on February 29, 2008 has been entered. Claim 17 has been amended; and claims 26-32 have been added. Overall, claims 17-32 are pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 17-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katoh et al. (U.S. Patent 5,402,641) in view Ozawa et al. (U.S. Patent 5,075,276).

Re claim 17, as illustrated in Figures 1 and 5, Katoh et al. disclose a process for purifying exhaust gas from lean burning internal combustion engines by using an exhaust gas purifying-use catalyst (6) containing a noble metal (platinum) and a transition metal (copper) (see line 61 of column 3 to line 3 of column 4) and which removes hydrocarbons, carbon monoxide, and nitrogen oxides from the exhaust gas,

the catalyst being obtained by mixing the noble metal and the transition metal with or carrying the noble metal and the transition metal by a fire-resistant inorganic oxide, the fire-resistant inorganic oxide being active alumina (line 62 of column 3),

the engine being a type that burns a hydrocarbon fuel and being adapted to operate between a first exhaust gas state and a second exhaust gas state, depending on changes in air-fuel ratio (see at least lines 3-8 of the Abstract),

the exhaust gas entering the first exhaust gas state (stoichiometric or rich air-fuel ratio) at an air-fuel ratio of 13 to 15, an exhaust-gas temperature being in a range of 350°C to 800°C at an inlet of the catalyst in the first exhaust gas state (step 106 with YES answer and step 108) (in step 108, the first exhaust gas state is stoichiometric with an air-fuel ratio of 14.7),

the exhaust gas entering the second exhaust gas state (lean air-fuel ratios) at an air-fuel ratio of more than 15 to 50 (see lines 25-26 of column 5), an exhaust-gas temperature being in a range of 200°C to 500°C at the inlet of the catalyst in the second exhaust gas state (step 106 with NO answer and step 110).

Katoh et al., however, fail to disclose that their engine is a gasoline fuel-direct-injection type engine which allows fuel to be directly injected inside a cylinder of the engine; and that an amount of the noble metal being in a range of 0.01 to 50 g/liter with respect to the catalyst volume, the fire-resistant inorganic oxide having a BET surface area of 50 m^2/g to 200 m^2/g and having a pore diameter of 10 nm to 30 nm.

Katoh et al. disclose the claimed invention except for applying the invention to a gasoline fuel-direct-injection type engine. It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the invention of Katoh et al. to a gasoline fuel-

direct-injection type engine, since the recitation of such amounts to an intended use statement. Note that a gasoline fuel-direct-injection engine also generates exhaust gases containing harmful emissions of HC, NOx, soot, CO, and SOx, that require purification before the gases can be released to the atmosphere; and the mere selection of the purification process of Katoh et al. for use in a gasoline fuel-direct-injection engine would be well within the level of ordinary skill in the art.

Ozawa et al. disclose a catalyst adapted to purify hydrocarbons, carbon monoxide, and NOx in the exhaust gas of an internal combustion engine. As indicated on lines 15-62 of column 6, Ozawa et al. teach that their catalyst comprises a catalytically active coating having a platinum metal group and a high surface area support material. The platinum metal group is in a density range of 0.01 to 5 g/liter of the catalyst volume (see line 57 of column 6). The high surface area support material is a fire-resistant inorganic oxide (gamma alumina) having a BET surface area of 50 m^2/g to 200 m^2/g and having a pore diameter of 10 nm to 30 nm (300 angstrom = 30 nm) (see lines 16-20 of column 6). As depicted in Figure 2, Ozawa et al. further teach that their catalyst has relatively high purification efficiencies of HC, CO, and NOx based on said composition of the catalyst. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the density range of platinum and the inorganic oxide taught by Ozawa et al. in the catalyst of Katoh et al., since the use thereof would have provided a catalyst having high efficiencies in removing HC, CO, and NOx emissions in the exhaust gas.

Re claim 18, in the modified process of Katoh et al., the exhaust gas varies between the first exhaust gas state (stoichiometric or rich air-fuel ratio) and the second exhaust gas state (lean

air-fuel ratio) that forms a more oxidizing, low-temperature atmosphere as compared with the first exhaust gas state, depending on changes in air-fuel ratio.

Re claim 19, in the modified process of Katoh et al., the first exhaust-gas state (stoichiometric or rich air-fuel ratio) is a state at a time of high output of the gasoline engine of a fuel-direct-injection type, and the second exhaust-gas state (lean air-fuel ratio) is a state at a time of low output of the gasoline engine (see at least Figure 13 and lines 24-41 of column 10).

Re claim 20, in the modified process of Katoh et al., the exhaust gas is purified by removing hydrocarbon, carbon monoxide and nitrogen oxides from the exhaust gas by the use of the catalyst.

Re claim 21, in the modified process of Katoh et al., the transition metal (copper) is at least one selected from the group consisting of manganese, iron, cobalt, copper, and nickel.

Re claim 22, in the modified process of Katoh et al., the catalyst includes at least one noble metal (platinum) selected from the group consisting of platinum, rhodium, palladium and iridium.

Re claim 23, in the modified process of Katoh et al., the exhaust-gas temperature in the second exhaust-gas state (lean air-fuel ratio) ranges from 200°C to 350°C at the inlet of the catalyst.

Re claim 24, in the modified process of Katoh et al., the catalyst includes platinum and rhodium as the noble metal (see lines 65-66 of column 3).

Re claim 25, in the modified process of Katoh et al., the catalyst includes at least one of a cerium-oxide powder and a zirconium-oxide powder (see Table 2 and lines 50-62 of column 4 in Ozawa et al.).

Re claim 26, in the modified process of Katoh et al., when the temperature of the exhaust gas at the inlet of the catalyst is not more than 300°C, the catalyst is able to purify the exhaust gas that is in the second exhaust gas state (the catalyst in Katoh et al. is adapted to adsorb and remove NOx from the second (lean) exhaust gas state (see Figure 3A)).

Re claims 27-28, in the modified process of Katoh et al., when the temperature of the exhaust gas at the inlet of the catalyst is not less that 500°C, the catalyst is able to purify the exhaust gas that is in the first exhaust gas state (the catalyst in Katoh et al. is adapted to desorb and reduce NOx released from the catalyst during the first (stoichiometric or rich) exhaust gas state (see Figure 3B)).

Re claims 29-32, in the modified process of Katoh et al., when the temperature of the exhaust gas at the inlet of the catalyst is higher than 500°C, the catalyst is unable to reduce NOx contained in the exhaust gas that is in the second exhaust gas state (the catalyst in Katoh et al. is unable to reduce NOx from the second (lean) exhaust gas state).

Response to Arguments

4. Applicant's arguments with respect to the references applied in the previous Office Action have been fully considered but they are not persuasive.

In response to applicant's argument that Katoh et al. fail to disclose or teach a catalyst adapted to remove hydrocarbons, carbon monoxide, and nitrogen oxides from the exhaust gas (page 9 of the Applicant's Amendment), the examiner respectfully disagrees.

As illustrated in Figure 3A, the catalyst (6) in Katoh et al. is adapted to adsorb nitrogen oxides (NOx) in an exhaust gas stream during a second exhaust gas state (lean air-fuel ratio). From Figure 3B, the catalyst is caused during a first exhaust gas state (stoichiometric or rich air-fuel ratio) to release and reduce the adsorbed NOx. As can be seen in Figure 3B and indicated on lines 14-28 of column 4, the released NOx during the first exhaust gas state is chemically combined with hydrocarbons (HC) and carbon monoxide (CO) in the exhaust gas stream to form considerable harmless compounds of water, nitrogen, and carbon dioxide which are then released to the atmosphere. Thus, the catalyst in Katoh et al. is clearly adapted to remove hydrocarbons, carbon monoxide, and nitrogen oxides from the exhaust gas.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Communication

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Tu M. Nguyen/

TMN

Tu M. Nguyen

June 6, 2008

Primary Examiner

Art Unit 3748